Meteorological Aids Spectrum Issues

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Outline

- Allocations
- Current Spectrum Sharing
  - 400.15-406 MHz
  - 1668.4-1700 MHz
- Potential Sharing Issues
  - WRC Agenda Item 1.1
  - WRC Agenda Item 9.1.1
- Spectrum Efficiency
- Future Spectrum Use
- Resources

Allocated Bands- Meteorological Aids

- 27.5-28 MHz
  - No known use- made unusable in some countries in the 1970's – citizen band radios
- 400.15-406 MHZ
  - Used globally for radiosondes and dropsondes that employ NAVAIDS for windfinding
- 1668.4-1700 MHz
  - Used globally for radiosondes that employ radio direction finding for windfinding
  - Used by a few countries for NAVAID-based radiosondes
- 35.5-36 GHz
  - No known use

Metaids Spectrum Sharing

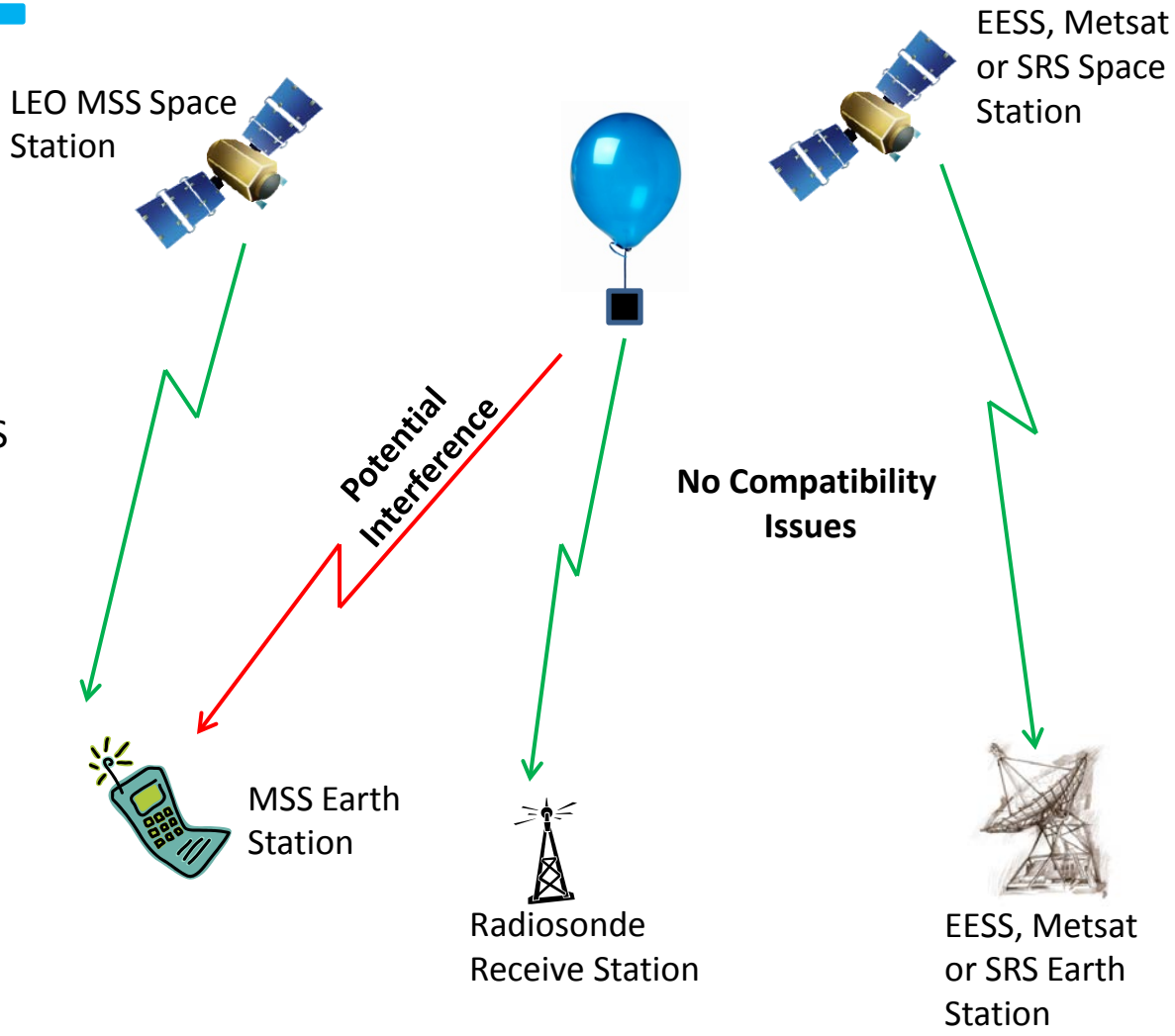
- Both the 400.15-406 MHz and 1668.4-1700 MHz bands are shared with other services.
  - Satellite systems
  - Low power medical communications
- The full allocations are not entirely useable by Metaids
  - Some countries have domestically reallocated portions to other radio services

Current Sharing in 400.15-406 MHz (400.15-401 MHz Segment)

-Band shared with multiple radio services with space to Earth links.

-Nature of SRS, Metsat and EESS operations allow for compatible sharing.

-Ubiquitous nature of MSS Earth stations will result in interference from radiosondes.

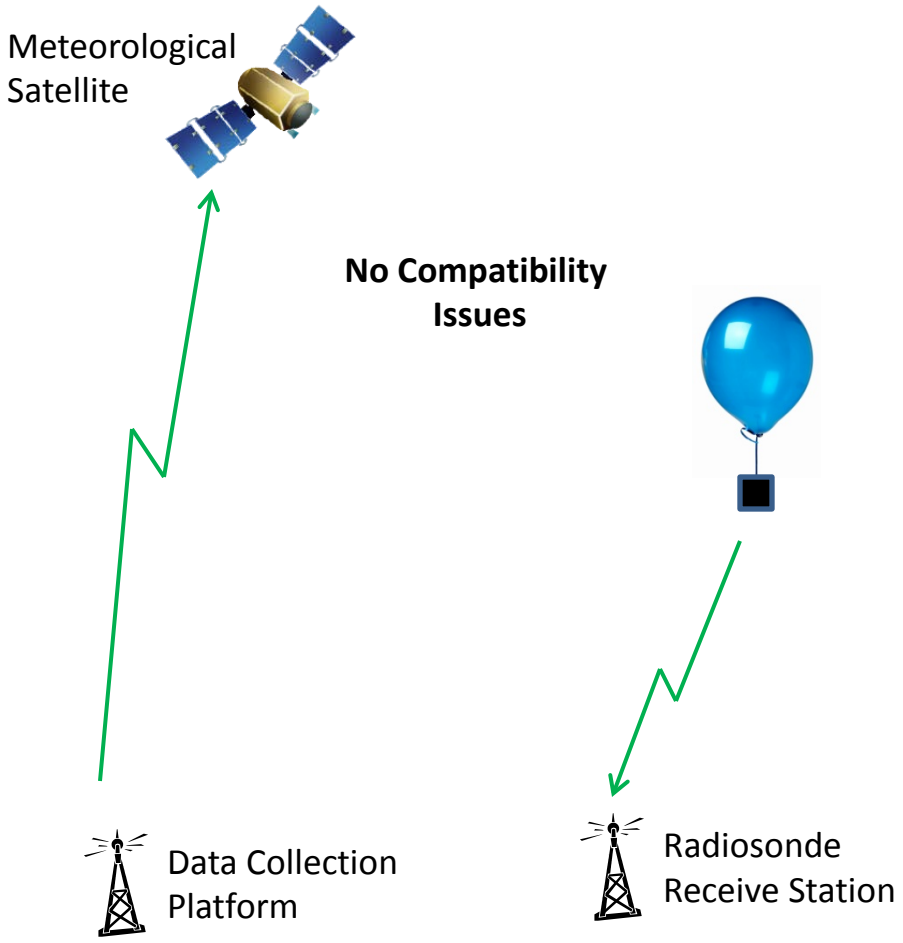


Current Sharing in 400.15-406 MHz (401-403 MHz Segment)

-Thousands of remote Data Collection Platforms transmit environmental data to satellite for retransmission to data users.

-Radiosonde signal levels sufficiently low enough to avoid interference to spaceborne Metsat receivers.

-Effect of brief DCP data bursts in same geographic area as a radiosonde receiver is insignificant. High duty cycle transmissions would be problematic.



Use of 401-406 MHz by Medical Implant Device Communications

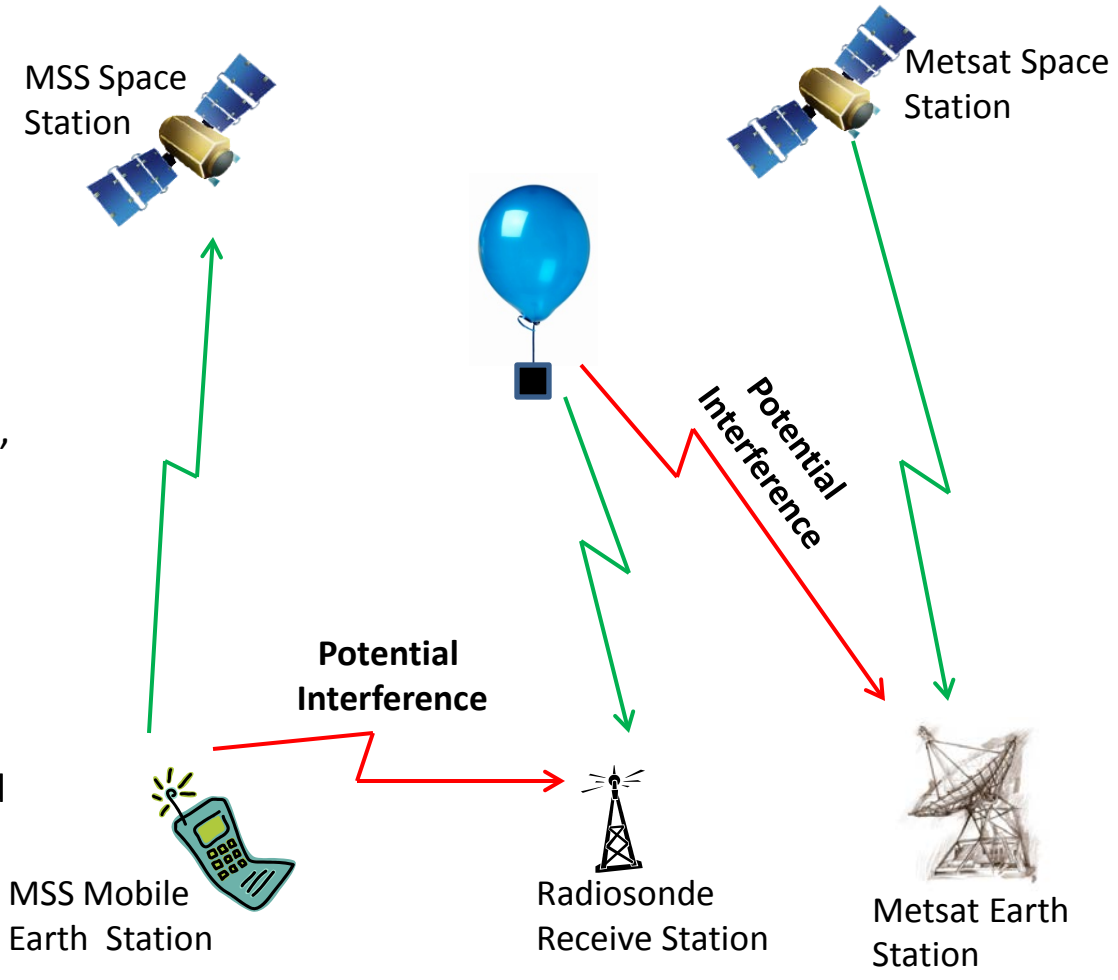
- Studied in the ITU during the 1997-1998 timeframe
- Restrictions defined in ITU-R Recommendation RS.1346.
  - Device communications activated in shielded hospital environment
  - Low radiosonde signal levels minimize interference probability to safe level
  - Error detection and correction
- Operation in 402-405 MHZ range -10 channels

Current Sharing in 1668.4-1700 MHz (1670-1675 MHz)

- MSS to radiosonde interference has not occurred due to lack of MSS operations in the band.

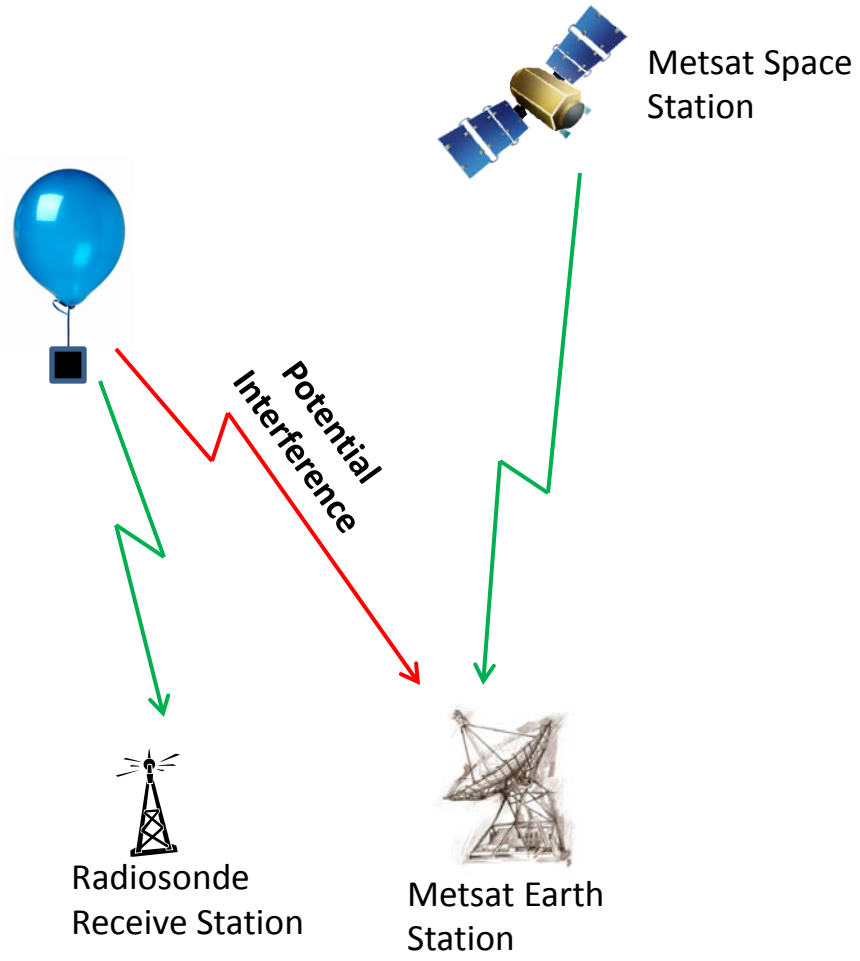
-If MSS were to deploy in the band, use of exclusion zones or moving radiosonde operations would be required.

-Radiosonde to Metsat Earth station interference is mitigated through use of exclusion zones and coordination (operators of both systems is generally the same entity).



Current Sharing in 1668.4-1700 MHz (1675-1700 MHz)

-Radiosonde to Metsat Earth station interference is mitigated through use of exclusion zones and coordination (operators of both systems is generally the same entity).



Potential Spectrum Issues

- WRC Agenda Item 1.1- Spectrum for Mobile Broadband
- WRC Agenda Item 9.1.1- Protection of COSPAS-SARSAT

WRC-15 Agenda Item 1.1

- Seeking spectrum for Mobile Broadband
- 1695-1710 MHz already identified for use in the U.S.
  - Requires U.S. radiosonde operations to compress to below 1680 MHz (1675-1680 MHz)
  - Compression required to avoid GOES-R data user downlinks that have been shifted below 1695 MHz.
- U.S. initiative could lead to an international allocation action under Agenda Item 1.1

Implications of Agenda Item 1.1

- Radiosondes and Broadband Mobile cannot share common spectrum in same geographic areas
- Use for broadband mobile will likely result in less spectrum available for radiosonde operations
- Less spectrum = need for more spectrally efficient radiosondes
- Higher spectrum efficiency will require more sophisticated radiosonde transmitters
- Cost for spectrum efficient transmitters is decreasing, making radiosonde spectrum efficiency more affordable

WRC-15 Agenda Item 9.1.1

- COSPAS-SARSAT is satellite based system for locating emergency situations for search and rescue.
  - Operates in 406-406.1 MHz
  - Afforded special protection as a safety service - no other emissions permitted in the band.
  - Unauthorized emissions make detection of EPIRB signals difficult
- Agenda Item could look at impact of radiosonde emissions in the adjacent band below 406 MHz.

Implications of WRC-15 Agenda Item 9.1.1

- Radiosondes operating just below 406 MHz do have some potential to cause interference to COSPAS-SARSAT
  - Drifting center frequency
  - Unwanted emissions
- Probability low for serious problems
- Some level of study probably required under Agenda Item 9.1.1

Design/Spectrum Efficiency Tradeoffs

- A radiosonde is an expendable device
  - Many hundreds used globally per day
  - Few are recovered and reusable
- Use of costly, highly spectrum-efficient technology not feasible
  - Comparisons have been made to aeronautical mobile radios
    - Radiosonde operates in a more hostile environment
    - Weight, density and power constraints
    - Don’t discard an aeronautical mobile transmitter when it is used
- Spectrum efficiency of a non-expendable transmitter is not possible is radiosonde operations

Future Metaids Spectrum Use

- Demand for spectrum dictates that metaids users employ cost-effective spectral efficient metaids systems
- Regulators should recognize the expendable nature of metaids systems and not assume that standard transmitter technology is usable.

Resources

- ITU RS-Series Recommendations

  ITU-R RS.1165
  ITU-R RS-1262
  ITU-R RS.1263
  ITU-R RS.1264
  ITU-R RS.1346
  ITU-R RS.1745

- ITU/WMO Handbook- ***Use of Radio Spectrum for Meteorology: Weather, Water and Climate Monitoring and Prediction***
- Periodic WMO Spectrum Workshops (generally prior to WRC)

Questions?


NOAA
NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION
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